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THE JOURNAL OF GEOGRAPHY

A MAGAZINE FOR SCHOOLS

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Dr. White is an associate professor of geography at Miami University. This article is the fourth and final one on the geography of the Salt Lake Oasis. The other three were "The Agricultural Geography of the Salt Lake Oasis," *Bulletin of the Scientific Laboratories of Denison University*, Vol. XXI, Sept. 1925; "The Insular Integrity of Industry in the Salt Lake Oasis" and "Transhumance in the Sheep Industry of the Salt Lake Region," both of which appeared in *Economic Geography*, July, 1925 and 1926, respectively.

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VOLUME XXVII JANUARY, 1928 NUMBER 1

THE DISTRIBUTION OF POPULATION IN THE SALT LAKE OASIS*

LANGDON WHITE

Miami University, Oxford, Ohio

The Salt Lake Oasis, comprising about 1 per cent of the area of Utah, contains approximately 65 per cent of the state's inhabitants and is the agricultural, industrial, commercial, political, religious, and cultural capital of the entire intermontane region.

Its original advantages were an abundant water supply, deep, fertile, well-drained lacustrine soils, and comparatively large tracts of level land. To these valuable resources, later development added important transcontinental railways and the output of rich mines of metallic and non-metallic minerals.

THE MORMON CONQUEST OF SALT LAKE VALLEY

On July 24, 1847, Brigham Young and his 146 faithful disciples arrived in the Valley of the Great Salt Lake after a long and tedious overland journey. "No waving fields, no swaying forests, no verdant meadows rested or refreshed their weary eyes. An eloquent church historian has described the scene as 'a desolation of centuries where earth seemed heaven-forsaken, where hermit Nature watching, waiting, weeped, and worshipped God amid eternal solitude.' "[1]

* The Salt Lake Oasis, an insular strip of human habitation at the western base of the Wasatch Mountains, is about 130 miles long, from 2 to 15 miles wide, and comprises about 680 square miles of occupied land. As physiographically defined, it comprises about 1300 square miles; but much of this is waterlogged and alkaline and consequently is unoccupied. For a detailed account of the geographic unity of the Salt Lake Oasis see: Langdon White, The Agricultural Geography of the Salt Lake Oasis, *Bulletin of the Scientific Laboratories of Denison University*, Vol. XXI, September, 1925, pp. 133-156.

[1] Charles Hillman Brough, Irrigation in Utah, p. 6. Baltimore, 1898

Young told them that this valley was to be their future home and that by hard work they could make it "blossom as the rose." Believing in him implicitly, they prepared to plant crops within a few hours after their arrival. Finding the earth too hard to cleave with the plow, they built a dam, flooded the surrounding land, and began their task anew. Next morning they planted potatoes, after which they gave their tiny field a good soaking. Thus they began the extensive and successful system of irrigation, which enabled them in a single generation to transform the hostile desert into a hospitable oasis.

Despite the bitter opposition of the East toward the Mormons the population of the Oasis reached 11,380 by 1850 and 40,000 before the first decade of settlement. The rapid Mormon immigration into Salt Lake City quickly led to the early occupation of the contiguous available arable and pasture land and forced expansion into neighboring valleys. Into every valley that his scouts reported suitable for farming, Brigham Young sent colonists led by experienced and efficient men of his own choosing. Many of the immigrants had been recruited from Eastern cities and from northwestern Europe, especially the British Isles and Fennoscandia. They were chiefly tradesmen and were not well fitted for the farm life they had to lead. Some of the practical farmers, too, were no better prepared for the new phase of agrarian life—irrigation.

The first few years of settlement were discouraging. Only by trial and error could the settlers adjust themselves to an irrigation economy. Just when increased population began to tax the food resources of the pioneers the Rocky Mountain locusts ate their crops and well nigh reduced them to starvation. Only strength of religious faith and the inrush of the 49'ers maintained their morale. The Mormon settlements became an oasis, indeed, for the weary gold seekers who here rested themselves and their jaded animals and replenished their supplies of provisions. From them the Mormons acquired at low cost the stores of food, clothing, and implements that they so sorely needed and exchanged their fresh but inferior livestock for the high grade but worn and footsore animals of the travelers.

But "in spite of all difficulties and vicissitudes, Brigham Young and his little band of colony builders resolved to build a noble edifice of economic fact, reared by human toil and held firmly in

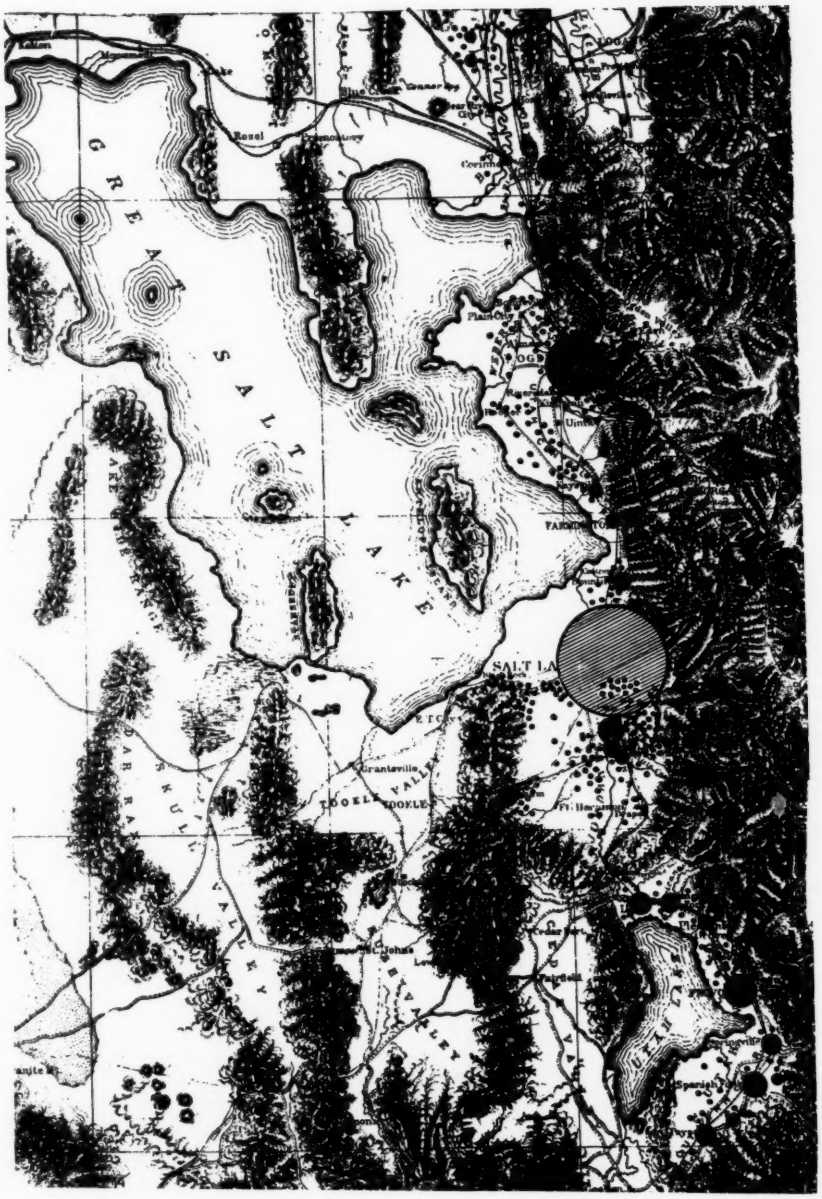


FIG. 1. The distribution of population in the Salt Lake Oasis in 1919. The small dots represent 200 persons; the large ones, which represent incorporated places, are proportional to the population. The map emphasizes the unimportance of isolated rural settlement in this region, and if it were possible to portray those farm villages which are not incorporated, this fact would be even more pronounced. The distribution of population is based on election precincts. Scale, approximately 20 miles per inch.

place by the average prosperity of all who had a part in its building.'"[2] The Salt Lake Oasis of the present is the realization of this resolution, for they made their sanctuary an insular seat of civilization in the arid wilderness, sufficient unto itself and hospitable to the peoples of the far corners of the earth.

The Concentration of the Population at the Western Foot of the Wasatch Mountains

The canyon streams, the soils and drainage, the level land, and the Mormon Church all have united to limit habitation to the foot of the Wasatch (Fig. 1).

The Adjustment to the Canyon Streams. In the desert water means life. The Mormon communities, then, paid a significant and enduring tribute to the value they placed upon water when they located practically all of their towns and villages on the fans and old deltas at the canyon mouths where they could divert water for irrigation and domestic purposes.

At Salt Lake City the settlers utilized the water of City Creek and Big Cottonwood for irrigation, and a field of winter wheat was planted before lots were assigned for building. In selecting Ogden, today the railway center of the intermontane West, they chose the land between the forks of the Ogden and Weber Rivers, so that they might divert water from both streams to irrigate their thirsty fields.[3] At Provo they utilized for power and irrigation the copious supply of water in the Provo River. The founding of these cities, the largest in the state, typifies the system of colonization followed thruout the growing commonwealth.

The entire western wall of the Wasatch from Fielding on the north to Santaquin on the south is seamed by canyon streams which rise in the Wasatch and Uinta mountains to the east. Since in general precipitation comes from some sort of uplift to the air, the mountains always get some rain from the uplift their slopes give the winds. It is certain that the Wasatch gets as much as 20 inches and that the Uintas get still more, possibly as much as 40 inches.

[2] Brough, Ibid., p. 6

[3] In the survey of any Mormon town, the points from which the lines were run were water sources. For instance the tract in which Ogden is enclosed is described as "commencing at the mouth of Weber Canyon, following the base of the mountain north to the Hot Springs, thence westward to the Great Salt Lake, along the southern shore of the lake to a point opposite Weber Canyon and thence to the point of beginning."

Precipitation begins to increase with altitude some distance west of the Wasatch and progresses at a fairly constant rate until near the summit where it begins to decrease. The area of diminished precipitation, however, is limited and therefore of little consequence. The rainfall on the Wasatch Mountains at elevations ranging from 7,500 to 8,700 feet is about ten times the amount received on the deserts 75 miles to the west. Tho the local topography induces a variable altitude relation, the increase of about four inches annually per 1,000 feet is strikingly uniform over the gradual uninterrupted slopes.[4]

The heaviest precipitation falls during the winter and spring periods. The summers are normally very dry; the little rain which falls comes in light thunder showers and hence has little value. The average number of stormy days in the Oasis having 0.01 inches or more of precipitation is about four a month in summer, eight in winter, and ten in spring tho the number increases with elevation. Much of the precipitation that falls in the mountains comes in the form of snow and melts slowly with the seasons thus forming a continuous supply of life-giving water for the thirsty valley settlements during the summer.

No streams of economic value emerge from the basin ranges which bound the Oasis on the west because of their restricted catchment basins. The few streams which trickle down their canyons are quickly dissipated by evaporation and seepage and consequently are valueless for irrigation.

The Adjustment to Drainage and Soils. During Pleistocene times much sediment was carried by streams from the Wasatch into Lake Bonneville, where still water caused immediate deposition. With the shrinking of the lake down to its present level (Great Salt Lake lies approximately 1,000 feet lower in the Salt Lake Basin than did Lake Bonneville) this material became exposed. Benches (deltas), consisting largely of gravel, lie near the canyon mouths where the lower gradient caused the rock material to accumulate; they are found only on the east side of the Oasis, because no large streams entered the old lake from the west. Sandy and loamy materials deposited by the receding water mantle the sides of the valleys while clay makes up the valley bottoms.

When the pioneer Mormons settled in the Valley of the Great

[4] J. Cecil Alter, "Normal Precipitation in Utah," *Monthly Weather Review*, September, 1919, pp. 633-634. (Washington)

Salt Lake they invariably reclaimed the middle belt not only because it comprised the most fertile soils, but also because it was easily accessible to irrigation streams. This land lying just below

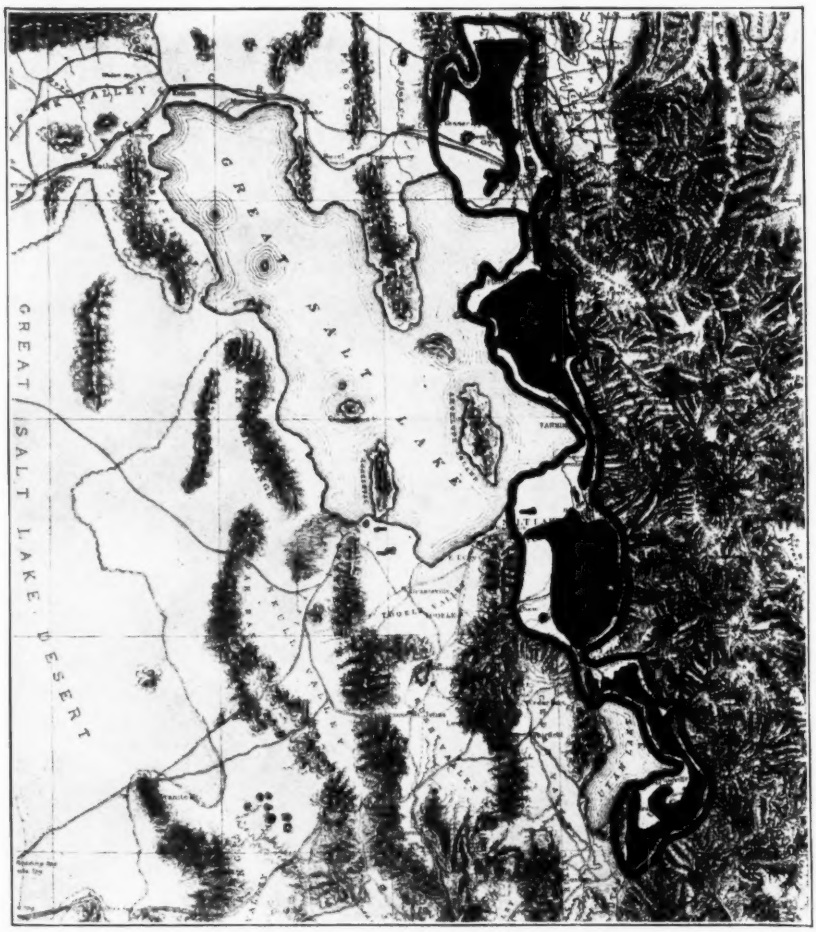


FIG. 2. The area enclosed by the black line is the Salt Lake Oasis as delimited by physical factors. The portion colored black indicates the approximate location and extent of irrigated land in the Oasis during the summer of 1925. Here live nearly two-thirds of the people of Utah. The uncolored part of the enclosed area is not occupied because of alkaline and waterlogged soils and scarcity of water. This map coincides remarkably well with that of population.

the benches was loamy in texture and fairly well drained. In a few years population became so dense that more land had to be reclaimed for tillage. Naturally this expansion was at first directed down stream because of the greater facility in handling the

water. But within a few years all the land of this type in the vicinity of Salt Lake City had been acquired. The higher lands then had to be used and these were tilled until the available water supply could serve no more land.

At first irrigation on the benches had no injurious effect on the original farms. But ere long certain farmers began to notice damp spots on their land. These spots became steadily larger until many of the lower lands became so wet that they had to be abandoned for crops and used for pasture. Excessive irrigation water applied at the higher levels percolated downward until it reached an impervious layer of soil. Flowing along this to a lower level it came near the surface and formed a wet spot. Moreover, whenever the higher ditches crossed a porous soil formation, they lost considerable water by seepage which augmented the waste due to excessive irrigation. Hence waterlogging became proportionately rapid and serious. Occasionally an entire town had to be moved as in the case of Draper just south of Salt Lake City. In such an event the owners were usually compensated by tracts of higher land.

It is a significant fact that the area occupied in the Oasis in 1925 coincides remarkably well with that of 1857—ten years after the arrival of the pioneers in the region (Fig. 2). This indicates that the land suitable for habitation was quickly acquired. Within recent years only the Strawberry Reclamation Project, the Sand Ridge, and the Riverton District have been added to the Oasis by drainage and irrigation. The occupied area in this physiographically defined region may some day be doubled, but this cannot occur until better methods of utilizing the water supply are employed[5] and the extensive waterlogged and alkaline lands in the lower portions of the valleys are drained.[6]

[5] In all the oldest sections numerous canals are to be found irrigating lands which should really be supplied by one. By this duplication of canals much precious water is wasted, the soil is injured thru seepage, and the area for settlement is appreciably reduced.

[6] Most of these lands adjoin Utah Lake and Great Salt Lake. They are valueless for the cultivation of crops until they are drained. The largest tract lies west of the River Jordan in Salt Lake Valley; this land with few exceptions serves only as winter range for sheep. When economic conditions will justify the reclamation of this vast, poorly drained, alkaline area, it probably will be done; no serious engineering difficulty stands in the way for there is ample fall for drainage north and west towards the lake. Only then will this vast level section of virgin land, which lies at the very door of the best market in the intermontane region, be embodied in the occupied Oasis.

The Adjustment to Level Land. It is estimated that not more than 10 per cent of the area of Utah ever can be cultivated with crops on account of rugged relief and aridity. It is patent, then, why the Salt Lake Oasis, which has both level land and water for irrigation, contains nearly two-thirds of the people of the state. Mark Jefferson emphasized this when he said: "If settlement is limited to the western foot of the Wasatch it is not wholly on account of superior water supplies but especially because of the greater amount of level ground with deep soils. The deposits of ancient Lake Bonneville and the wash from the mountains in more recent days have tended to cloak the western foot of the range with a mantle of fine rock waste which becomes a fertile soil as soon as water is added to it. The deep canyons of the Green and the Colorado cause the whole eastern region to be deeply dissected. Level expanses are very small there and the finer waste has been carried off to the sea."[7]

The Influence of the Mormon Church. Hardly less important than the environmental influence on the distribution of the people is that of the Mormon Church which, during the pioneer period, was the source of law in temporal as well as in spiritual matters. Indeed, the conditions which necessitated protection and irrigation lent themselves to the purpose of the Mormon leaders and served to render permanent the land system inaugurated by the Church.

Brigham Young recognized immediately the new property value acquired by water in irrigation-based communities. He realized that the land was valueless without the water and that with the limited supply of the latter, the land would have to be held in small parcels to be utilized efficiently, for irrigation agriculture required intensive tillage. He therefore divided the land so that each person got only as much as he could faithfully cultivate. To professional and business men he gave lots averaging one and one-fourth acres near the center of town; to mechanics and artisans he allotted plots of five acres a little farther out; and to farmers he assigned the ten, twenty, and sixty acre tracts in the country, the amount depending on the size of the family. Thus the division of land values was remarkably even, for what one man lacked in the area of his portion he gained by its location. It was designed that every man should be a landowner and no one a tenant. This

[7] Mark Jefferson, "Utah, the Oasis at the Foot of the Wasatch," *Geographical Review*, 1916, pp. 354-55

distribution of the land was admirably adapted to the natural environment of the region and to the needs of a young and small settlement but revealed serious limitations when population increased and large scale agricultural enterprises became imperative.

Brigham Young not only allocated the land to the settlers, but he also directed the colonization, personally supervising it to the minutest detail. He chose the leaders for each colony, prescribed the numbers and equipment, and gave detailed instructions regarding the location, colony government, intercourse with the Indians, and the crops to be planted. By this means he established settlements on the available streams and pre-empted at an early date most of the territory occupied in the Oasis today.

Distribution of the Population at the Eastern Base of the Oquirrh Mountains

The few settlements at the foot of the Oquirrh Mountains differ from the many at the foot of the Wasatch in that they are not old Mormon towns but are mining and smelting towns.[8]

Bingham, with a population of 2,676 persons in 1919, lies in Bingham Canyon and is one of the world's largest copper camps. Copper was discovered here in 1862 by soldiers from Fort Douglas.

Arthur and Magna, which are huddled at the foot of the mountains about fifteen miles southwest of Salt Lake City, have large concentration mills. They treat the low grade ore from Bingham before it is sent to Garfield.

Garfield, the big copper smelting center, lies between Great Salt Lake and the Oquirrh Range. Formerly Murray, which is seven miles south of Salt Lake City, smelted the ore from Bingham but the deadly sulphuric acid gas poisoned the crops in Salt Lake Valley and a new smelter site had to be found. Garfield was chosen because of its excellent transportation facilities, its great stretches of cheap land, its adaptability for the economical handling of material by gravity, and the fact that the prevailing winds carry the smoke either into the mountains or over the lake.

[8] Fearing that mining would break down their plan of systematically colonizing the Great Basin, the Mormon leaders so discouraged prospecting that minerals were scarcely touched until 1862—fifteen years after the pioneers entered the region and then only by the soldiers stationed at Fort Douglas. The Mormons refrained from prospecting until the Church approved of it following the completion of the Union Pacific Railway in 1869.

THE CONCENTRATION OF THE POPULATION IN URBAN CENTERS

In addition to those engaged in commerce, industry, and the professions, who ordinarily are urban dwellers, approximately 90 per cent of the farmers in the Salt Lake Oasis live in cities, towns, and villages. These towns are compact, self sufficient, and are separated by short distances of field or desert from neighboring towns. Murray King says, "The Church, the desert, and the

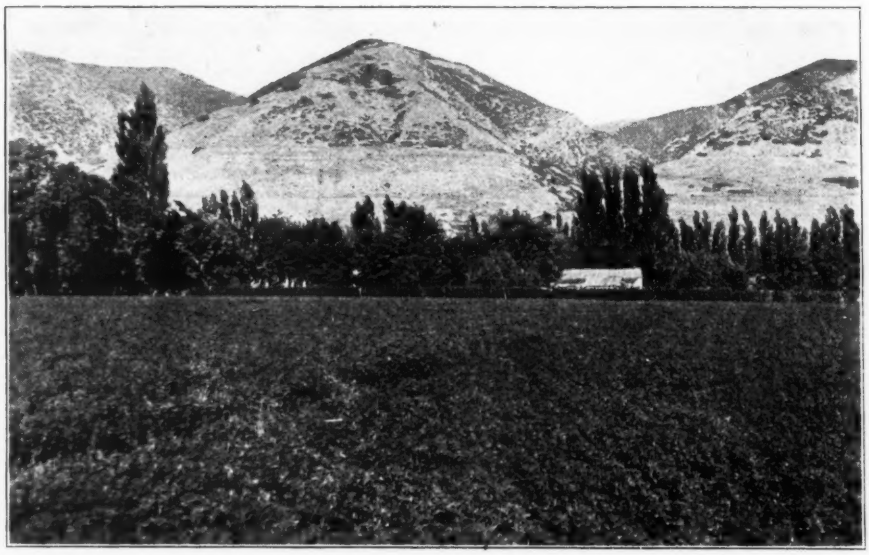


FIG. 3. The cozy rural village of Centerville, just north of Salt Lake City at the foot of the Wasatch Mountains, is typical of all Oasis towns. It is girdled by green fields and adorned with orchards and shade trees. The dwellings are comfortable but not imposing in appearance. All are situated on lots of generous proportions, which provide room for a house, outbuildings, a vegetable garden, and an orchard. Here the farmers live a quiet, peaceful, industrious semi-rural life. Photo by C. C. Colby.

canyon stream have conspired to produce this village concentration."

This town dwelling custom of the farmers is a heritage of Indian days, when the problem of protection was a grave one and every settlement became a fort, with its agricultural lands encompassing it. This "close settlement" naturally fostered community villages as opposed to scattered farms (Fig. 3). When the Red Man was finally expelled and it became possible to erect real homes town plots were laid out and were drawn by lot.

The encompassing desert also discouraged the diffusion of the population into small groups. In Utah no restless pioneer pushed

out single-handed into the desert wilderness, for under the restrictive conditions imposed by nature, only a compact cooperative society could prosper. Cooperation became the maxim among the Mormons and worked so well in the ownership of water that it found expression in other activities.[9]

The Mormon leaders also wanted their followers to live in towns. Brigham Young came from New England (Vermont), and understood the salient advantages of the old form of village government. He wished to have the settlers establish and maintain homes at a common center surrounded by their farms so that they might enjoy the privileges of worship, education, and social and economic intercourse which go with community life. It was in the church meeting houses that the young people gathered and it was there that the men discussed what canals should be dug, what roads made, what fences put up, and what bridges constructed.

The Church also created so many religious activities and so monopolized social affairs that it could not function except in organized communities. The farmer necessarily became the main support in a highly structured town life.

The dwarf farms, also a heritage of pioneer days, have much to do with keeping the farmers in town. They are consequent upon scarcity of arable land, a limited amount of water for irrigation, dense population,[10] and the early Mormon land system.

In the Oasis a farmer frequently owns 15 or 25 acres of land in three or four pieces separated from one another by appreciable distances. Where all these are located close together the inconvenience of the arrangement is not pronounced. But often they lie several miles from home in three or four different directions. For example, a man may have a field three miles from home in one direction, another field four miles away in another, and the remainder as far or farther in a third. The roads may be so planned that the shortest route from the field in which work is going to another is back to town and out. Under such conditions the farmer prefers to live in town. A score of such farmers told the writer that if all their land were in one piece they would move into the country

[9] If one settlement had two millers and another had none, one of the millers would be "called" to move to the place where his services were needed. In this manner the settlements were knit into a more or less self-sustaining whole.

[10] The density of population for the occupied Oasis, 680 square miles, is about 390.7 persons per square mile; that for the state is 5.5 persons per square mile.

immediately, for they realized that they were prohibited from many small economies and secondary farm activities which would greatly increase their revenue. They find it impracticable to keep livestock and poultry in town, except for a few chickens and a cow, both serious nuisances to their neighbors. When cows are kept, they are put on rented pastures during the day and led home at night by boy herders. They find it next to impossible to keep swine and sheep. The result is that they lose not only the produce from livestock, but the manure which is so indispensable to efficient tillage.

The amenities of town life also tend to keep the farmers in towns. These appeal especially to the wives of the farmers, who find in town less drudgery, more conveniences, better sanitary conditions, enhanced social opportunities, and better schools for their children.

THE POSSIBLE FUTURE OF THE DISTRIBUTION OF THE PEOPLE OF THE OASIS

In all probability the distribution of the population in the Salt Lake Oasis will be much the same in the not too distant future as it is now and as it has been for the past few decades. Probably no more urban centers will be added.

Cultivation has expanded until little irrigable land is left, and the agricultural area seems to be occupied by a maximum of people. In fact, many of the farms in the older districts are so small that their labor income,[11] even when the land is cultivated intensively,[12] is insufficient to meet the needs of the large Mormon families (Fig. 4). To ameliorate their condition and extend their agricultural operations, the farmers are renting or purchasing additional land, raising wheat and barley under dry farming methods on the bench lands, or running cattle and sheep on the mountain and desert

[11] The "labor income" is the amount that the farmer has left for his labor after 5 per cent interest on the average capital is deducted from the farm income. It represents what the farmer earned as a result of his year's labor after the earning power of his capital has been deducted.

[12] With the land area as limited as is at present the case, the problem is to make the most of what is at hand and grow as much as possible of the most profitable crops which are adapted to the region and its market facilities. The typical small operator, therefore, concentrates as far as possible on crops which give a high return per acre and on crops which can be marketed locally. In many districts the sugar beet is the mainstay, and many farmers specialize on beets, producing little else for sale.

ranges. Dry-farming, because of the limited extent of suitable land, is limited, and similarly range grazing on the heavily stocked national forests because of the restricted grazing permits, is restricted. The high price of farm land in the Oasis makes its purchase almost prohibitive, and to rent additional land means the elimination of one's neighbors in such a densely populated region. Thus the situation is serious indeed.[13]

FIG. 4. An Oasis farming district east of Murray. The close-spacing of the homes and the intensive tillage indicate dense population, dwarf farms, and expensive land.

The occupied area in the Oasis will expand; small patches of waterlogged and alkaline land will be reclaimed by drainage with each passing year; portions of the bench-lands, now above the ditch, will be made irrigable by the construction of high-line canals; choice lands in the oldest sections may be reclaimed by bringing in water from sources outside the watershed of the Salt Lake Basin as was done on the Strawberry Reclamation Project,

[13] In 1914, when conditions were normal, farmers in Salt Lake Valley with less than 20 acres received a labor income of only $139; those with 20 to 50 acres received $308; and those with 50 to 100 acres, 100 to 200, and 200 and more, made $543, $882, and $1,198 respectively. These figures tell their own story; farms must comprise at least 50 acres and preferably 100 to 200 acres if the American standards of living are to be maintained. The solution of the problem, however, is not easy, because of the high price of the land, the high rate of interest, and the home instinct of the people. The only logical practice under such circumstances is to rent additional land, in order to enlarge the scale of the farming operations.

or by pumping from wells, or by demolishing the old pioneer irrigation works with their needless duplication of canals and the resultant loss of water thru evaporation and seepage, and replacing them by new scientific projects, or by constructing more reservoirs for storing the flood waters, which now are wasted. But these innovations cannot take place quickly and may never occur.

There is also a tendency for many Oasis farmers to move into the country. This has been augmented recently by the hard surface roads, which now pierce the region in many directions, and also by the reclamation of new areas such as the Strawberry Project, the Sand Ridge, the Riverton district, and the Bear River area, where the farms are appreciably larger than those in the first settled districts. It is probable, however, that the majority of the farmers who are Mormons will continue to live in towns and villages.

SUMMARY

The Oasis at the foot of the Wasatch, originally one of the most barren spots in arid America, has become a most fruitful region and the capital of the Intermontane West. With a density of population of 390.7 persons per square mile, the Oasis stands as an island of dense population in the sparsely settled arid and mountainous wilderness of Utah with its population density of only 5.5 persons per square mile.

The majority of the people of the Oasis are concentrated in cities and towns on the fans at the mouths of the canyon streams which emerge from the Wasatch, where fertile, well-drained land for food production exists and where irrigation is feasible.

These towns are distributed at the foot of the Wasatch at intervals of approximately five miles, the spacing being fixed by the extent to which the farm areas are improved, which of course depends on the availability of water and on good drainage. It is for this reason that the map of urban centers of the Oasis accords so closely with that of irrigated lands. (Figs. 1 and 2.)

THE VALLEYS OF NEW YORK IN THE AMERICAN REVOLUTION*

ALBERT PERRY BRIGHAM

Colgate University

If the United States were bordered on the north by a warlike people, New York would be as strategic ground as it was for two centuries of its early history. The state differs from the other Atlantic states in surface and in geographic position. In the period of the American Revolution, it was set apart from New England, not more by its physical geography, than by the character of its population and by its economic, social and political life.

New England's share of the Revolution is known and justly honored. What New York did and endured is not so well known, for what is now the Empire State saw the most critical campaign of the war, was the victim of border savagery thruout the war, and suffered more and longer than any other colony.

New York was more exposed to attack on account of its central position and its configuration. New York had no such powerful leaders as James Otis, Samuel Adams, John Adams, and John Hancock, and therefore perhaps seemed less devoted to the cause of independence. The colony was full of loyalists. Such were the merchants of New York, the patroons of the Hudson Valley, and the sons of Sir William Johnson in the Mohawk Valley. Property owners they were, and timid as men of wealth are likely to be. Then New York was under the dark shadow of the Iroquois tribes on the north and west. Lexington, Concord, Bunker Hill, and fugitive happenings like the burning of Danbury, summed up the direct ravages of war for New England. Even the battle of Bennington, fought by New England men, with its memorial in Vermont, was fought across the boundary on the soil of New York. Truly has the colony been called "The Flanders of America."

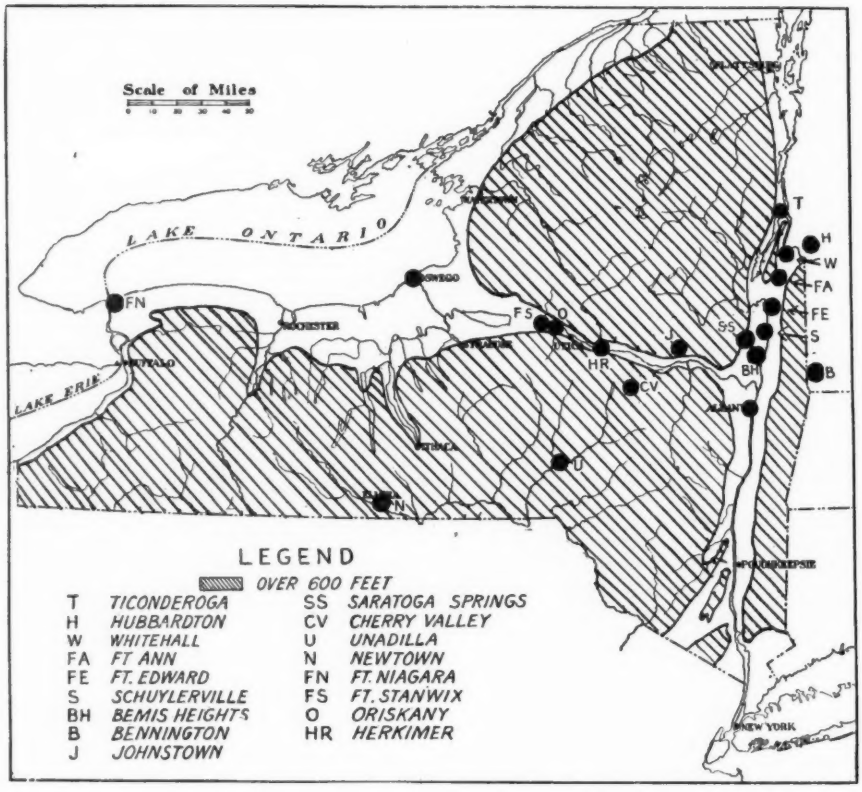
THE RIVER SYSTEMS AND TOPOGRAPHY

If the reader will refer to the accompanying map, he will visualize the three great highlands of New York. These are, the Adirondacks, with an outlying slice of the Appalachian plateau west of

* An address given before the New England History Teachers' Association meeting in Boston, December 4, 1926

the Black River; the great plateau of the state stretching from the eastern escarpment of the Catskill Mountains to Chautauqua and the borders of Lake Erie; and east of the Hudson, the foothills of the great ranges of western New England.

The waters of continental New York reach the sea by five great rivers. Here is a drainage more surprising than that of any other state, and only paralleled in the remoteness of its connections by



three or four states of the Rocky Mountain belt. Apart from sober geographical fact, one could never guess that the surplus waters of a single northern state on the Atlantic border should reach the sea by the Gulf of St. Lawrence, New York Bay, Delaware Bay, Chesapeake Bay, and the Gulf of Mexico. No one of these five river basins in New York was free from the horrors of war in the Revolution; and the Hudson-Mohawk, the Laurentian, and the Susquehanna Valleys were trodden pathways of war.

THE VALLEYS AND APPALACHIAN GATEWAYS

Let the reader look at a relief map of North America. See the remarkable general alignment of the lower Mississippi, the Ohio River, the lower Great Lakes, and the St. Lawrence River. Observe how they lie near to and parallel to the Appalachian ranges and the Appalachian plateau from Louisiana to the Maritime Provinces of Canada.

Now it is only in New York that this great highland border is effectively crossed by valleys. We may almost say that New York alone readily links the Atlantic Ocean to the continental interior. Pennsylvania indeed reaches from tidewater to Lake Erie, but it has no effective gateway at low altitude from Delaware Bay to the Great Lakes. But in New York we go from New York City to Montreal, past the Palisades, thru the highland gorge, between the Catskills and the Berkshires, over the low divide of 147 feet at Fort Ann, and down the Champlain trough between the Adirondacks and the Green Mountains. If we turn aside at Albany for the west, we arrive easily at Oswego, Niagara and the continental interior. One steep grade out of Albany, to arrive at the top of the great Iroquois delta below Schenectady, is the only impediment to the swiftest of railway runs from the seaboard to the Rocky Mountains.

Look once more at the state, from the north and west. Upon the lowlands of the Lakes and of the St. Lawrence is a four hundred mile course from Chautauqua to Montreal. Albany, Niagara and Montreal have been well said to mark the limits of a "strategic triangle."

Our map gives no indication of the altitudes of the Susquehanna and other valleys of the plateau. As a rule they are not very far above or below a thousand feet, but even at that they are so deeply cut in the great mass as to furnish some of the most important military and commercial highways in the state.

THE VALLEYS USED IN WAR LONG BEFORE THE REVOLUTION

Not long ago the writer visited Mt. McGregor, a few miles north of Saratoga Springs, on an outlying spur of the Adirondack Mountains, and there, a few rods from the cottage in which General Grant died, he stood where the great soldier had had a customary outlook across the Hudson Valley to the long ranging crests of

the Green Mountains. There was something fitting in remembering that Grant stood there, for below him in that noble valley, more war parties and for a longer period, had passed, than thru any other valley in the western hemisphere. It was two hundred and five years from Champlain's first shot at the Iroquois on the site of Ticonderoga to McDonough's naval victory in 1814, on Lake Champlain.

In 1666 the Marquis de Tracy went from the St. Lawrence River to the Mohawk by this route, to avenge the death of Sieur Chazy. It was a French invasion of English territory. In 1690, Frontenac's forces aiming at Albany wrought the winter massacre at Schenectady, and there were reprisals by John and Peter Schuyler in 1690 and 1691 marking the first hostile movement toward Lake Champlain. In Queen Ann's War in 1709 the New England and other colonies set out to conquer Canada, and there were built forts at Stillwater, old Saratoga (Schuylerville), Fort Edward and, beyond the carrying place, Fort Ann. In this year the French came up the Lakes to Crown Point, but there was no military clash. The year 1731 found the French settled at Crown Point menacing New York and New England. From Crown Point in 1745, went many marauding expeditions southwest, culminating in the massacre at old Saratoga.

Coming now to the great war which brought Canada under English rule, we have in 1755 Sir William Johnson's campaign to Crown Point and Canada, and here we encounter Israel Putnam and John Stark winning a bloody victory, but with no move on Crown Point, and the French were left to fortify Ticonderoga. In 1757 Moncalm moved against Albany and there followed the butchery at Fort William Henry. In 1758 the colonies suffered terrible defeat under Abercrombie at Ticonderoga; and in 1759 Amherst drove the French from Ticonderoga and Crown Point, to which they were never to return.

All this was prior to the Revolution, but shows how habitual was the use of the Champlain-Hudson as a military pathway.

Lower Hudson

There is no space in this paper to describe the movements on the Lower Hudson valley during the Revolution. Every reader of American history knows that Washington in one of the greatest feats of generalship rescued his army from the trap on Brooklyn

Heights, retreated safely to north Manhattan, averted a flank movement of the enemy at White Plains, lost Forts Washington and Lee on the banks of the Hudson, held the highlands, and retreated into New Jersey with his main army for actions that made his name immortal.

It was a part of the British plan to seize and hold the entire valley from New York Bay to the St. Lawrence River, and in the carrying out of this plan operations on the lower Hudson were essential. We turn now to,—

THE SARATOGA CAMPAIGN

This was planned by Lord George Germaine in the quiet seclusion of a London office, and was to be carried out by Burgoyne acting in conjunction with Howe from New York and St. Leger from Oswego and Fort Stanwix. This campaign has been called by one historian the "second blow at the center." If carried out it would isolate New England from the southern colonies and break the heart of the confederacy. It is no part of our plan to give the story of this campaign, but rather to make certain observations on the geographic conditions which the colony offered.

The British planned a campaign on converging lines. These are bad in war, especially war in a wilderness. Burgoyne could not communicate with Howe and St. Leger. More truthfully, perhaps, we should say that communication was precarious, for if a messenger was caught, he was hanged.

The Americans on the other hand had interior communications. After the battle of Oriskany, Arnold was sent to relieve Fort Stanwix, and so effective was the rumor of his coming that St. Leger, his white men and his Indians, disappeared long before Arnold reached the head of the valley. To the Americans along these same interior lines swarmed recruits from New England, and Morgan and his sharpshooters were sent to Schuyler by Washington from the south.

A united British force coming from New York could probably have forced the Hudson and it would have been as useful to the British to take Albany from one direction as from three; but they could not get over the habit of invading New York by way of Champlain, as it had been done for more than a hundred years. Thus Germaine and his parlor war counsellors doomed Burgoyne. They doubtless used small scale maps on which New York looked

the size of an English county, the Adirondacks and Green Mountains seemed as open as the hill ranges of England, and the Mohawk and Hudson appeared like the bottom lands of the Thames.*

We have noted Burgoyne's difficulties. He had no co-operation with Howe and St. Leger. He was lengthening a line in a wild country. Loyalists support was not at hand, and the New England patriots (politely called "vultures" by one English historian) were ever on his flank. He was handicapped by his Indian forces, who by their gluttony destroyed his supplies and by their savagery horrified London and America alike. We may truthfully say that the fighting power of the savages did not offset the patriot rage that was aroused; and the death of poor Jane McCrea, sad as it was, was worth an army to the colonists. Schuyler had swept the valley bare of food, and Burgoyne went to his doom.

There is no harder problem in war than the lengthening of communications and the holding of bases. Look at the northern army in the Civil War, based on the Ohio River at Louisville, Cincinnati, and Cairo; then they stretched their lines to Nashville and piled up hard fighting and constant hazard by reaching out to Chattanooga; and after the fall of Chattanooga, the lines reached Atlanta. Thence Sherman marched to the sea, not as often thought, for wanton destruction, but to get a new base. To maintain his lines back to the Ohio River was no longer possible, and he must jump to the sea and rest on a new base there, as he moved northward thru the Carolinas to join the army of the Potomac.

Communication is imperatve in all warfare, for food, for military supplies, for the return of sick and wounded, and to retreat if necessary. Detachment of forces to guard communications weakens the fighting army, and a soldier has said that a general has "a hundred anxious thoughts about the lines in the rear to one about the enemy in front." Thus Burgoyne begged Carleton on the St. Lawrence to send him reinforcements, when he left one-eighth of his force to guard Ticonderoga, and when his army otherwise than by formal detachment dwindled on the long and terrible march.

To illustrate further, when the Civil War closed, there were eleven hundred thousand men under arms in the Union Army, but

* Sir George Otto Trevelyan, The American Revolution, Part III, p. 122

only a quarter of these were in contact with the enemy. The rest were guarding the lines and holding conquered territory.

It may be useful, after all, to summarize the movements of the Saratoga campaign, again suggesting that the reader follow the map. St. Clair abandoned Ticonderoga to Burgoyne July 5, 1777. His rear guard was overtaken by the British at Hubbardton, Vermont, July 7; and he joined Schuyler at Fort Edward, July 12. This was the Americans' darkest day. Schuyler had but three thousand men, with no artillery, no tents and much illness. For reasons which need not be discussed, he had been abandoned by the New England volunteers; but in spite of the sorrows of Schuyler, Burgoyne's cheerful dispatches to London may be called, to put it mildly, premature.

It was now Burgoyne's turn to worry. Ticonderoga, as we have seen, demanded a fighting force. He should have returned to Ticonderoga, and proceeded by Lake George. Good authorities think he could then have reached Fort Edward by July 13, have conquered Schuyler and captured Albany. He chose, however, to go from Fort Ann to Fort Edward. Schuyler had destroyed the bridges and cut down the trees across the trail. Corduroy roads had to be laid in the swamps, and altogether his experience was a fine exhibition of chimney corner strategy. He reached Fort Edward July 30, having marched twenty miles in twenty days!

General Schuyler was blamed for retreating southward, but such Fabian tactics counted for much in a war in the wilderness. There was time for recruiting. The burning of Danbury overcame the hostility of the New England recruits, and they were happy to join Lincoln in a flanking force in Vermont. The exhaustion of Burgoyne's supplies was accomplished and the Green Mountain boys decided that the fate of Jane McCrea should not be visited upon their wives and children. Burgoyne thought to avail himself of the stores at Bennington thirty miles southeast of Fort Edward, and thither he sent an army. What John Stark did to that army need not here be told, but we may quote his historian who writes, —it was like "thrusting a bare hand into a bee hive in quest of honey" for Burgoyne to seek food in the Green Mountains.

Oriskany was fought by Herkimer and his Mohawk Dutchmen on August 6. For its numbers, it was the "bloodiest conflict of the war." It destroyed Burgoyne's hopes from the west. It perhaps

swung the balance of war against him; and yet Oriskany is barely mentioned in some school histories.

While Schuyler retreated and waited, Washington sent Morgan's five hundred sharpshooters from the mountains of Virginia and Pennsylvania. These men could hit a small object at sixty yards and they could march six hundred miles in three weeks. The Indians did not like them, and the British at Bemis Heights suffered from them. Schuyler gathered the supplies of Lincoln, Stark and Arnold, was ready for victory, and then by the will of politicians in Philadelphia turned his command over to the schemer Horatio Gates.

Burgoyne crossed his bridge of boats at Schuylerville, September 13, fought the first battle on Bemis Heights, September 19, the second battle, October 7, and made his surrender, October 16.

Thus the critical battle of the Revolution and one of the great battles of history was fought in the Hudson Valley. The final issue was delayed but no longer doubtful. American sentiment was heartened, French aid secured and Britain began to see the futility of its policy.

SULLIVAN'S EXPEDITION

New York was yet to see years of invasion and massacre by Iroquois and Tory, hovering on the edge of the wilderness. A series of murderous outrages prompted Congress to chastise the Indians and blot out their power.

This was accomplished by an expedition under General Sullivan. In this the valleys of New York were threaded for hundreds of miles by armies. General Clinton went up the Mohawk to Canajoharie, and crossed the divide to Otsego Lake, to descend the Susquehanna. Sullivan gathered his forces in southern New York, in New Jersey and in Pennsylvania, crossed the country to Wyoming on the Susquehanna and ascended that river. Broadhead came up the Allegheny Valley from Pittsburgh and attacked the Indian settlements of southwestern New York. Sullivan and Clinton met on the southern border, fought the foe at Newtown (Elmira) and then destroyed the villages, the orchards, the gardens and the standing corn of the Finger Lake Valleys and the Genesee. The campaign was a series of raids in four of the main valley systems of the state, viz.: the Susquehanna, the Hudson-Mohawk, the Genesee (St. Lawrence system) and the Allegheny. The power of the Iroquois was forever broken, but not their capacity to sting, and raids and massacres continued to afflict the frontiersmen of

New York until the end of the war. The last bloody encounter in New York was the battle of Johnstown, fought as usual between loyalists with their Indian allies, and the colonists. It was not known at the time that Cornwallis had already surrendered at Yorktown.

SUMMARY

The Hudson-Champlain and the Hudson-Mohawk valleys, cutting the Appalachians from the sea to the interior, made New York military ground for 200 years. The British effort to cut off New England from the southern colonies, resulted in Oriskany, Bennington, and Saratoga and determined the future of the colonies. The presence of the Iroquois in the "Long House," kept New York's frontier in bloody turmoil thruout the war. Of 308 battles of the Revolution, 92 were fought on the soil of New York. No other colony suffered so severely or so long.

GEOGRAPHY PUZZLE CHARTS ON THE CONTINENT OF EUROPE

LESLIE L. SUDWEEKS

Public Schools, Kimberly, Idaho

TO THE TEACHER

The following set of puzzles has been prepared especially for use in fifth grade work to supplement the regular geography text. Their practical value has been demonstrated by actual classroom use in the Kimberly Public Schools. It is the belief of the author that the set will prove extremely helpful to any elementary class studying the geography of Europe with any of the standard texts in use.

HOW TO USE THE PUZZLES

The following plan is suggested:

First, the pupils study their geography text in the usual way with the regular class recitations.

Second, after each unit (country or group of countries) has been studied in this manner the pupil proceeds to work out the puzzle on that particular country as a review exercise. As much as possible should be done without reference to the text. If this plan is followed the puzzle becomes a sort of self-test exercise, enabling the pupil to check up on himself and look up the facts which he does not know. Each word in the puzzle is really a "key

word'' suggesting an important fact about the country in question so that the exercise is really a brief but thoro review. The puzzle also gives the pupil training in the correct spelling of geographical names.

Third, the puzzles are handed in to the teacher and returned with an O. K. or the correction marked.

Fourth, comes the testing—preferably in the following period, or on the same day in which the puzzles are filled out and returned.

Fifth, the completed puzzles are studied as reviews for larger units of work such as for ''Six Weeks'' and ''Semester Tests.'' The completion type of test is preferable for this purpose.

How to Test

In the following period, or as soon as convenient after the puzzle has been completed, a brief test of the ''one-word'' or oral comprehension type should be given.

Much time will be saved in grading and handling, as well as presenting a neater appearance, if uniform paper is provided by the teacher. A convenient size is 4¼″ by 5½″ made by tearing ordinary sheets of bond paper into fourths by means of a ruler.

After the slips have been passed out each pupil writes ''Geography Test'' and his name at the top, then numbers the remainder of the page from 1 to 14 (or any other desired number) as if for a spelling test.

Next the teacher reads orally a list of questions, pausing a few seconds after each to allow the pupils time for writing the answers. The questions should be so worded that they may be answered in one or two words, or, at most, a brief phrase. After the last question has been answered the papers are collected promptly. The remainder of the period may be profitably used in discussing the questions orally. The papers can be scored quickly and should be returned to the pupils as soon as possible. If desired, papers may be exchanged and scored by the pupils themselves as the questions are answered orally. In this case care should be used in seeing that the pupils write their answers with pencil and score with ink or vice versa. If correct spelling is being stressed 1 per cent may be deducted for each misspelled name of a city, mountain, river, ocean, etc.

It should be borne in mind that the test is *not* intended to be a test on the puzzle but a test on the country. The puzzle is merely an aid to the pupil in reviewing the important facts about the

country. Any facts which the teacher has stressed, regardless of whether they appear in the puzzle, may be legitimately included in the test.

For a 20-minute period 14 questions seems to be about right (counting each 7 per cent). These can be answered in from 10 to 12 minutes, leaving the remaining 8 to 10 minutes for class discussion or correction of papers.

A sample set of questions and a pupil's paper follow to illustrate the form:

5B GEOGRAPHY TEST ON SCANDINAVIA

1. What are Norway, Sweden, and Denmark called?
2. What were the people of Norway called in olden times?
3. Name one thing tourists go to Norway to see.
4. For what occupation are the people of Norway and Sweden noted?
5. Name an important natural product of Norway and Sweden.
6. What manufactured product from Sweden do we often see in the United States?
7. Name the capital of *one* of the Scandinavian countries.
8. Name *one* occupation that the sailors are engaged in.
9. Is Denmark a good country for farming? Why?
10. What is the chief industry of Denmark?
11. What sea is on the west of Scandinavia?
12. On the east?
13. What ocean is on the north?
14. What country borders Denmark on the south?

5B GEOGRAPHY TEST

JOHN DOE

1. The Scandinavian Countries
2. Norsemen
3. fiords
4. sailors
5. lumber
6. safety matches
7. Copenhagen—Denmark
8. fishing
9. No, too sandy
10. dairying
11. North Sea
12. Baltic Sea
13. Arctic Ocean
14. Germany

TO THE PUPIL

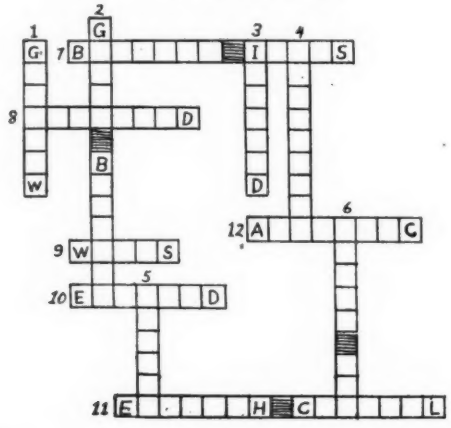
Here is an interesting little book for you which will turn your geography lessons into a fascinating game. On each page you will find a puzzle for an important country or group of countries in Europe. After you have finished studying the British Isles in your geography text open this little book and try to work out the first two puzzles. You may use the map in your geography, if necessary, in order to spell each word correctly. Try your best to learn these words as you work the puzzle. When you have finished your teacher will give you a little test to see how well you have learned them. Do the same for each country.

How to Work the Puzzles

Each puzzle is made up of a number of words such as the names of important cities, rivers, mountains, industries, and products of the country you have been studying. Many of these you have already learned from your geography book. In the puzzles these words are criss-crossed so that all the words about one country are connected together. You will notice that many of the letters are left out and that the squares are blank. The game is to print the letters that are left out in these blank squares. Notice that each word is numbered and that below you will find a statement or phrase describing that word. This will help you to fit the right word into the puzzle. Be sure to do your own work without any help from your neighbor.

I. BRITISH ISLES

General Facts Puzzle



Words Reading Down

1. A city in Scotland noted for shipbuilding
2. The largest island of the British Isles
3. The second island of the British Isles
4. An important seaport of Great Britain
5. Capital of the British Empire and a great seaport
6. A sea east of the British Isles

Words Reading Across

7. An important country of northwestern Europe
8. A country of Great Britain
9. A country of Great Britain
10. A country of Great Britain
11. A body of water separating England and France
12. An ocean west of the British Isles

II. BRITISH ISLES

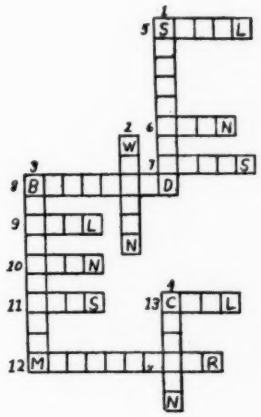
INDUSTRIAL PUZZLE

Words Reading Down

1. A city noted for iron and steel manufacturing
2. A kind of goods manufactured at Leeds
3. A city noted for iron and steel manufacturing
4. A kind of goods manufactured at Manchester

Words Reading Across

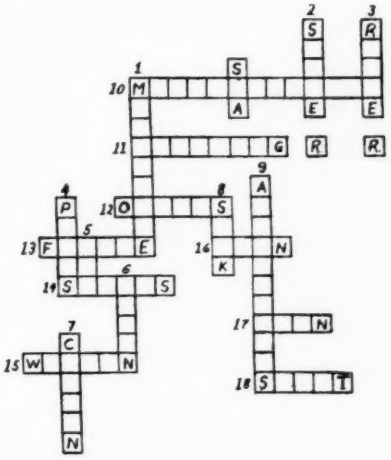
5. A product manufactured at Sheffield
6. A product manufactured at Sheffield
7. A city noted for woolen goods
8. A city noted for woolen goods
9. A product manufactured at Birmingham
10. A kind of ore which is needed at Birmingham
11. A product manufactured at Birmingham
12. A city noted for cotton goods
13. A mineral which the factories need



III. FRANCE

Words Reading Down

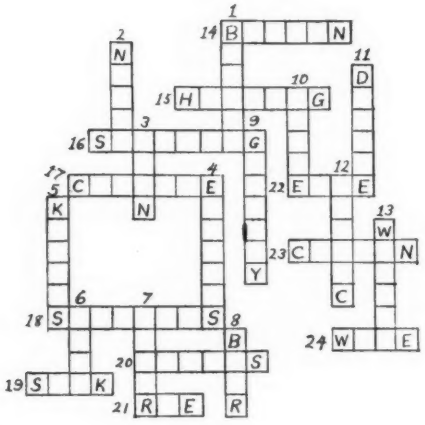
1. The chief seaport of France
2. An important river
3. An important river
4. Capital of France
5. A kind of work for which Paris is noted
6. A kind of cloth manufactured in France
7. A kind of cloth
8. A very fine kind of cloth made at Lyon
9. A kind of machinery made at Lyon



Words Reading Across

10. A large body of water south of France
11. An industry for which Marseille is noted
12. A fruit grown in southern France
13. A country of western Europe
14. Something for which Paris is noted
15. A kind of cloth made in France
16. A city noted for the manufacture of silk and automobiles
17. A manufactured product of Lyon
18. A manufactured product of Lyon

IV. GERMANY



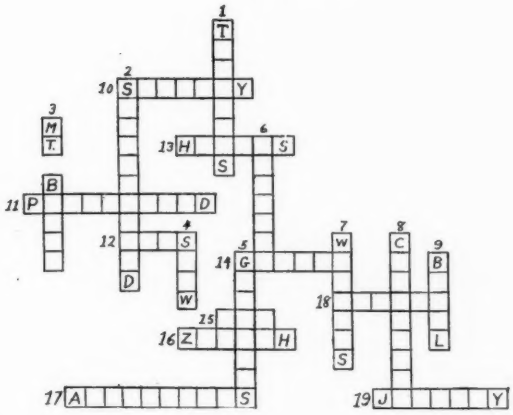
Words Reading Down

1. An important seaport of Germany
2. A sea north of Germany
3. A kind of ore mined near Cologne
4. A kind of machinery manufactured at Cologne
5. A kind of tool made at Cologne
6. A kind of ore mined near Cologne
7. One of the most important products of Germany
8. A drink the Germans like
9. A country of central Europe
10. The chief river of Germany
11. An important river in southern Germany
12. A sea north of Germany
13. A kind of cloth

Words Reading Across

14. Capital of Germany
15. The chief seaport
16. An industry for which Hamburg is noted
17. One of the greatest iron and steel cities of the world
19. A kind of cloth
20. A fruit from which wine is made
21. A grain from which the Germans make their bread
22. An important river in Germany
23. A kind of cloth manufactured in Germany
24. A drink made from grapes, which the Germans like

V. SWITZERLAND



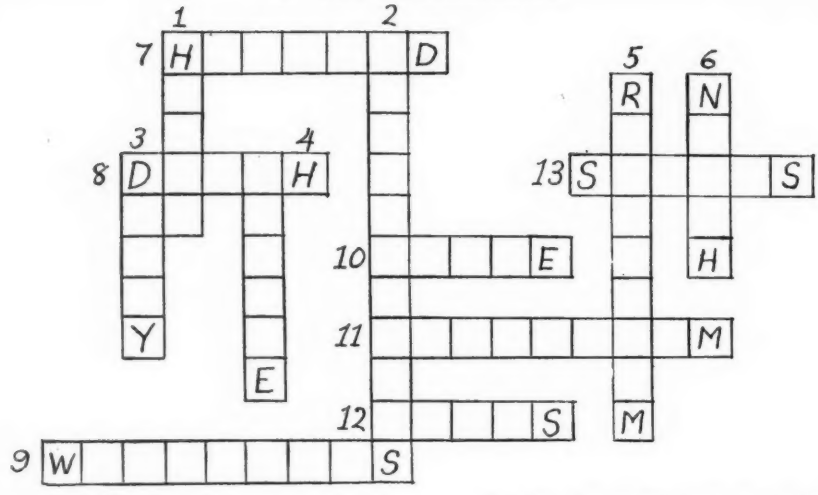
Words Reading Down

1. The name given to people who visit other countries
2. A country of central Europe
3. A high mountain that tourists like to climb
4. Something found on the tops of the mountains
5. Ice on the mountain slopes
6. A beautiful lake and city of the same name
7. A kind of instrument made at Geneva
8. A kind of candy the Swiss make with goat's milk
9. A city in northern Switzerland

Words Reading Across

10. What tourists go to Switzerland to see
11. What Switzerland is sometimes called
12. A famous range of mountains
13. Where the tourists stay (an important industry of Switzerland)
14. A beautiful lake and city of the same name
15. What the glaciers are made of
16. A lake and city in northeastern Switzerland
17. Another name for snowslides
18. A kind of instrument made at Geneva
19. Gold and silver ornaments made in Switzerland

VI. THE NETHERLANDS



Words Reading Down

1. Capital of The Netherlands
2. A tiny country of Europe
3. An important kind of industry
4. A dairy product
5. An important seaport at the mouth of the Rhine River
6. A sea that borders The Netherlands

Words Reading Across

7. Another name for The Netherlands
8. What the people of The Netherlands are called
9. Machinery used to pump water and grind corn
10. An important river which rises in Switzerland, flows thru Germany, and has its mouth in The Netherlands
11. An important seaport
12. A bank built to keep out the sea
13. A bird which is protected by law

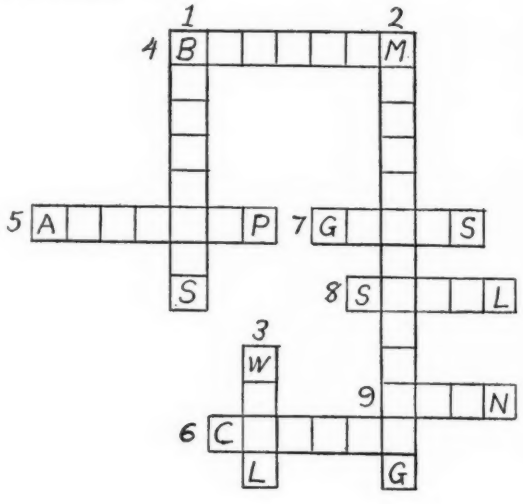
VII. BELGIUM

Words Reading Down

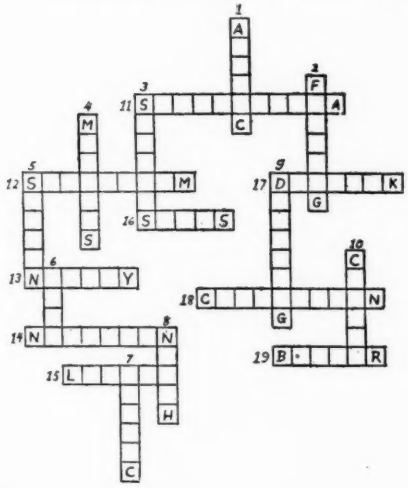
1. Capital of Belgium
2. Chief industry of Belgium
3. A kind of cloth manufactured in Belgium

Words Reading Across

4. A small country in Europe
5. Chief seaport of Belgium
6. A kind of cloth manufactured in Belgium
7. A manufactured product
8. A kind of manufacturing
9. A kind of manufacturing



VIII. THE SCANDINAVIAN COUNTRIES



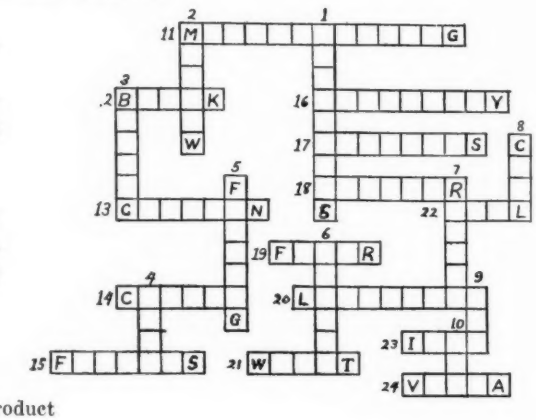
Words Reading Down

1. An ocean on the north of Norway
2. An important industry of the Scandinavian countries
3. What many young men of Scandinavia become
4. A manufactured product of Sweden often seen in the United States
5. One of the Scandinavian countries
6. Capital of Norway
7. A sea on the east of Sweden
8. A sea on the west of the Scandinavian countries
9. The chief industry of Denmark
10. A product of Denmark

Words Reading Across

11. The name given to Norway, Sweden, and Denmark
12. Capital of Sweden
13. One of the Scandinavian countries
14. The name given to the people of Norway in olden times
15. A product of the forest
16. Something Norway is noted for building
17. One of the Scandinavian countries
18. Capital of Denmark
19. A famous product Denmark ships to other countries

IX. RUSSIA



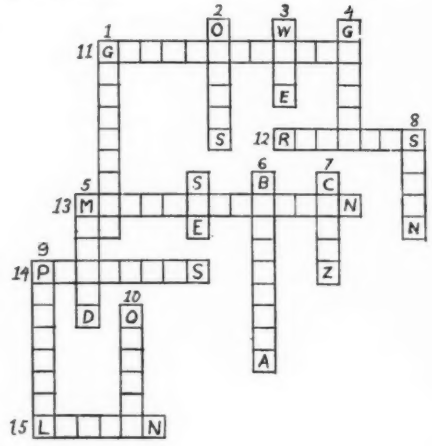
Words Reading Down

1. A manufactured product of Moscow
2. Chief manufacturing city of Russia and present capital
3. A sea west of Russia
4. A farm product (a grain)
5. Chief industry of Russia
6. A seaport of the Black Sea
7. A large country
8. An important mineral
9. A large river
10. An important mineral product

Words Reading Across

11. The chief industry of Moscow
12. A sea south of Russia
13. A sea southeast of Russia
14. A farm product of southern Russia
15. A natural product which covers one-third of Russia
16. A manufactured product of Moscow
17. A range of mountains in southern Russia
18. A manufactured product of Moscow
19. A manufactured product for which Odessa is noted
20. A seaport on the Baltic
21. An important farm product of Russia
22. A range of mountains in eastern Russia
23. An important mineral mined in Russia
24. The largest river in Europe

X. SPAIN AND PORTUGAL



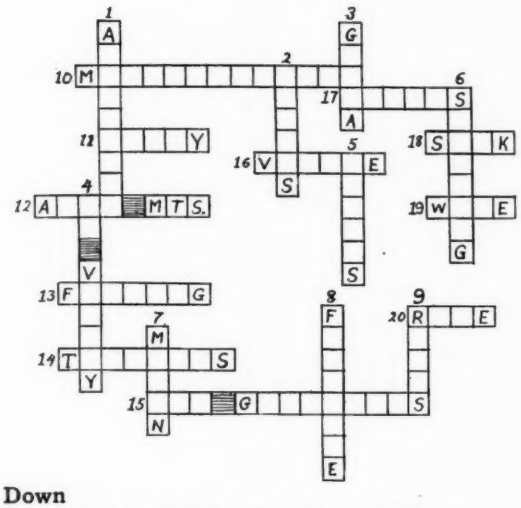
Words Reading Down

1. A fort at the southern tip of Spain owned by the British
2. A fruit from which oil is pressed
3. A drink, made from grapes, for which Spain is noted
4. A kind of fruit
5. Capital of Spain
6. An important seaport of Spain
7. An important seaport of Spain
8. A country of southwestern Europe
9. A country near Spain
10. An important seaport of Portugal

Words Reading Across

11. A fertile river valley of Spain
12. A product made by drying grapes
13. A sea southeast of Spain
14. A high range of mountains between France and Spain
15. Capital and chief seaport of Portugal

XI. ITALY



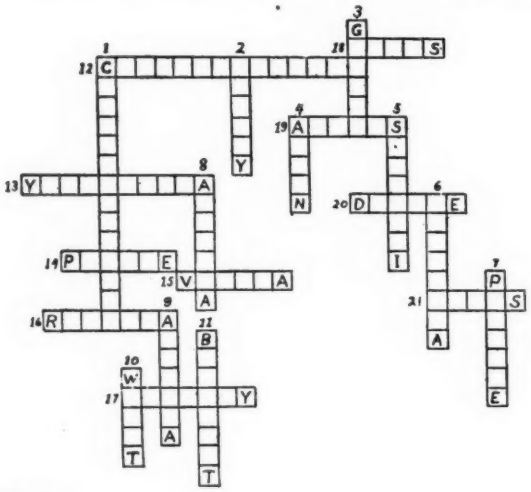
Words Reading Down

1. A range of mountains called the "backbone of Italy"
2. A city on the western coast
3. The chief seaport of Italy
4. A rich farming district of northern Italy
5. What the streets of Venice are
6. Chief industry of Genoa
7. Chief manufacturing city of Italy
8. A city noted for its art galleries
9. What Rome is noted for

Words Reading Across

10. A sea south of Italy
11. A country of southern Europe
12. A range of mountains which borders northern Italy
13. The chief industry of the Po Valley
14. A kind of goods made at Milan
15. What Florence is noted for
16. A city of canals
17. A fruit from which oil is pressed (an important export of Italy)
18. An important seaport
19. A drink which Italy exports to other countries
20. Capital of Italy

XII. COUNTRIES OF THE DANUBE-BALKAN GROUPS



Words Reading Down

1. The most progressive country of the Danube group
2. A Balkan country partly in Europe and partly in Asia
3. A very old country noted for its ancient ruins
4. A sea southeast of Greece
5. Chief seaport of Greece
6. A country on the Black Sea
7. A manufactured product of Bulgaria
8. A country of the Danube group
9. The smallest Balkan country
10. A product grown on the vast plains of Hungary
11. Capital of Hungary and famous flour-milling center

Words Reading Across

12. Chief city of Turkey
13. A country on the Adriatic Sea
14. Capital of Czechoslovakia
15. Capital of Austria
16. A large country on the Black Sea
17. A country noted for wheat-growing and flour-milling
18. What Greece is noted for
19. Capital of Greece, noted for ancient ruins
20. An important river
21. An interesting farm product of Bulgaria

PUZZLE ANSWERS

BRITISH ISLES
Gen. Facts

1. Glasgow
2. Great Britain
3. Ireland
4. Liverpool
5. London
6. North Sea
7. British Isles
8. Scotland
9. Wales
10. England
11. English Channel
12. Atlantic

BRITISH ISLES
Industrial

1. Sheffield
2. woolen
3. Birmingham
4. cotton
5. steel
6. iron
7. Leeds
8. Bradford
9. rail(s)
10. iron
11. guns
12. Manchester
13. coal

FRANCE

1. Marseille
2. Seine R.
3. Rhone R.
4. Paris
5. art
6. linen
7. cotton
8. silk
9. automobiles
10. Mediterranean
11. shipping
12. olives
13. France
14. styles
15. woolen
16. iron
17. iron
18. steel

GERMANY

1. Bremen
2. North
3. iron
4. engines
5. knives
6. coal
7. sugar
8. beer
9. Germany
10. Rhine
11. Danube
12. Baltic
13. woolen
14. Berlin
15. Hamburg
16. shipping
17. Cologne
18. scissors
19. silk
20. grapes
21. rye
22. Elbe
23. cotton
24. wine

SWITZERLAND

1. tourists
2. Switzerland
3. Mt. Blanc
4. snow
5. glaciers
6. Lucerne
7. watches
8. chocolate
9. Basil
10. scenery
11. Baltic
12. Alps
13. hotels
14. Geneva
15. ice
16. Zurich
17. avalanches
18. clocks
19. jewelry

NETHERLANDS

1. (The) Hague
2. Netherlands
3. dairy
4. cheese
5. Rotterdam
6. North
7. Holland
8. Dutch
9. windmills
10. Rhine
11. Amsterdam
12. dykes
13. storks

BELGIUM

1. Brussels
2. manufacturing
3. wool
4. Belgium
5. Antwerp
6. cotton
7. glass
8. steel
9. iron

SCANDINAVIA

1. Arctic
2. fishing
3. sailors
4. matches
5. Sweden
6. Oslo
7. Baltic
8. North
9. dairying
10. cheese
11. Scandinavia
12. Stockholm
13. Norway
14. Norsemen
15. lumber
16. ships
17. Denmark
18. Copenhagen
19. butter

RUSSIA	SPAIN AND PORTUGAL	ITALY	DANUBE AND BALKANS
1. chemicals	1. Gibraltar	1. Apennines	1. Czechoslovakia
2. Moscow	2. olives	2. Naples	2. Turkey
3. Baltic	3. wine	3. Genoa	3. Greece
4. oats	4. grapes	4. Po Valley	4. Agean
5. farming	5. Madrid	5. canals	5. Saloniki
6. Odessa	6. Barcelona	6. shipping	6. Bulgaria
7. Russia	7. Cadiz	7. Milan	7. perfume
8. coal	8. Spain	8. Florence	8. Austria
9. Don	9. Portugal	9. ruins	9. Albania
10. oil	10. Oporto	10. Mediterranean	10. wheat
11. manufacturing	11. Guadalquivir	11. Italy	11. Budapest
12. Black	12. raisins	12. Alps Mts.	12. Constantinople
13. Caspian	13. Mediterranean	13. farming	13. Yugoslavia
14. cotton	14. Pyrenees	14. textiles	14. Prague
15. forests	15. Lisbon	15. art galleries	15. Vienna
16. machinery		16. Venice	16. Rumania
17. Caucasus		17. olives	17. Hungary
18. leather		18. silk	18. ruins
19. flour		19. wine	19. Athens
20. Leningrad		20. Rome	20. Danube
21. wheat			21. roses
22. Ural			
23. iron			
24. Volga			

THE NEW ENGLAND FLOOD

JULIA M. SHIPMAN
Clark University

From the point of view of destruction to life and property, New England recently experienced the worst flood in its history. While nearly every stream reached flood stage and caused some damage, the area most affected was in the western part. The valleys of the Connecticut River and its western tributaries, together with some mountain valleys leading into the Champlain depression, mark the area of greatest losses. This includes western New Hampshire, Massachusetts, and Connecticut and practically all of Vermont.

THE STORM ITSELF

The immediate cause of the flood was a torrential downpour which began on November 2 and continued for about thirty-six hours. According to the United States Weather Bureau at Northfield, Vermont, the heaviest precipitation occurred between twelve noon and six P.M., November 3, when four inches of rain fell on

ground whose thin cover of mantle rock was already saturated by the preceding rains. The total rainfall for this station was 8.36 inches, but other reports exceed that; the highest given being 10.5 inches in southern Vermont. The rainfall decreased toward the east: White River Junction, Vermont, reported 6.59 inches in thirty-six hours; Concord, New Hampshire, 5.32 inches in twenty-four hours; Clinton, Massachusetts, a total of 6.75 inches; Worcester, 4.65 inches, and Boston, 1.81 inches.

The weather records show that an abnormally high pressure area was present along the coast from Newfoundland nearly to Bermuda. The heavy rainfall came from two low pressure areas. One storm came from the west and was turned southward by the area of high pressure in the St. Lawrence Valley. The second storm came north from the coast of Cuba and would probably have continued to follow the coast had not this great high-pressure wall deflected it up the Connecticut Valley. The southern storm, having come from the tropics, was warm air well filled with moisture and the other also showed high humidity, so that the two in conjunction broke all records for rainfall in this vicinity.

REASONS FOR EXTENSIVE DAMAGE

Someone has estimated that 7,000,000,000 tons of water fell; 4,000,000,000 in Vermont, which is 432,115 tons to the square mile. Whatever the exact number of tons, it was of volume great enough to be an enormous weapon of destruction, since the water courses were not of sufficient size to hold it within bounds. One Vermont brook, ordinarily fifteen feet wide, spread to 100 feet and left its natural course, cutting a gorge in one place 200 feet wide and 150 feet deep.* The buoyant power of this great flood enabled it to float houses and mills many yards from their foundations. In addition to the increased volume, the waters had their power increased by the speed with which they moved down the watersheds.

* An advance report from the U. S. Geological Survey shows "that the Pemigewasset River at Plymouth, New Hampshire, with a previous maximum high-water stage of 18.17 feet in a record of forty-one years, had in this year's flood a peak stage of 28 feet. The Winooski River, with a previous record stage of 13 feet on the crest of the dam at Winooski Gorge, Vermont, had in this flood a stage of 27 feet. The flood stage of the Connecticut River at Holyoke, Massachusetts, exceeded that of the flood of 1854, which was 3.1 feet higher than the flood of 1869. It is now believed that this year's flood at Holyoke was higher than any previous flood of which there is knowledge, and it is noteworthy that the records at this locality extend back to 1683."—EDITOR

Most of these mountain valleys are steep-sided, precipitous in places, and many landslides changed the courses of small streams, bringing a sudden onslaught to the farms in the valley bottoms from a totally unexpected direction. Most of the higher watersheds are tree covered but the trees are small and the soil thin, so that the ability to slow up the deluge was soon over-reached. Below the woods, but above the farms and villages, are pastures which could offer no obstruction to the down-rushing waters.

Areas of Greatest Damage

Thruout New England it is quite the custom to build homes and barns near the rivers since the lines of communication also follow them. The older mills often overhung the banks because their power was in early days derived from water wheels. Practically all such were swept away and much of the lowlands covered with ten inches to four feet of mud. The havoc was greatest along two Vermont rivers, the Lamoille and the Winooski, where several villages were almost entirely wiped out. These are the longest rivers and both flow westward thru narrow, winding, steep-sided valleys, with farms and villages along their courses. The Deerfield and Westfield rivers in western Massachusetts are of this same type, rising near one another in the Berkshires and flowing into the Connecticut in nearly parallel courses. The Deerfield has been so well impounded with dams of such sturdy and modern type of construction that little damage was done along its way. The Westfield and its tributaries, on the other hand, not so completely impounded, and with dams of older type were characterized by much greater destruction. The breaking of an old dam on one of the branches caused the destruction of the village of Becket, so complete that its rebuilding is doubtful. The main street is now the new channel of the stream. These two streams should be an interesting laboratory for comparative studies in flood prevention.

Types of Damage

The destruction included not only the washing away of buildings along many streams, but the almost total tie-up of industry and traffic for varying periods, according to the location. The basements of many mills contained the power plant, boilers, and stock so that they could not be run for days, or even weeks, after the water receded. Many types of mills were affected, including those

making cotton, woolen or silk goods, paper, machinery, wooden articles, pulp, lumber, and shoes. While industry was temporarily paralyzed here, many areas beyond this flooded section were also affected.

Most of the railroads and highways follow the river valleys, which added to the mileage damaged or destroyed. The Boston and Maine railroad reported 880 miles washed out. Some of the roads were passable before the end of a week, but one line in Vermont will probably never be replaced. It was only nineteen miles long, but served a farming and quarrying region. Two lines will have to be re-routed in places so that there is little hope of service this winter. Cities like Barre and Montpelier are, for the time being, doing their shipping by trucks, which is both slow and hazardous, due to the condition of the highways. According to a recent report to the Vermont legislature more than 900 bridges are down in Vermont, and winter is not a good time for bridge building in that climate. Railroads and roads have great gullies twenty to fifty feet deep to fill, but fortunately there is plenty of rock in New England that can be used. In one Vermont town —Cavendish—is a great hole where before were the major parts of three farms. This, of course, cannot be replaced nor can many of the gullies in other fertile fields. The materials taken from the hillsides, varying from silt to boulders, were spread over the lower fields, highways, and village streets. Hundreds of houses had from a few inches to several feet of silt on at least one floor. Farther south, barn after barn of stored tobacco was flooded and everywhere cattle, horses, and chickens were drowned.

REHABILITATION

Most of the railroads are owned or leased by large companies, such as the New York Central and the Canadian National, so they can take care of rehabilitation; within a week after the flood thousands of men were at work to do all possible before winter set in. The burden of restoring bridges and highways will be divided between states, counties, and towns, with the probability of federal aid. This damage is estimated at $7,000,000 for Vermont alone, and for New Hampshire $2,700,000. The industrial paralysis cannot be surmounted until railroads and highways are in usable condition and there must be aid from some source for replacing buildings, machinery and stock. Some of the 5,000 un-

employed can find work in rehabilitation, but many are women and to some it will mean an idle winter or moving to a new locality. Their earning power is badly curtailed at a time when there is greatest demand upon it, for it was often the mill workers who lived on low land near the streams, and they, therefore, suffered most from high water. The personal losses in household effects, clothing, winter supplies stored in cellars, implements and stock, can, in some measure, be replaced by the Red Cross, but the question of the future looms large. Will the mill rebuild there or elsewhere? Is there enough left of the farm to pay to carry it on? Frequently the low-lying meadows fed the dairy cows that were the milk supply of the industrial centers. Twenty-five hundred milk cows were lost and about 4,000 acres of meadowland were rendered unfit for use.

Flood Control

Other floods have preceded this one and more may follow. What is to be done in the way of flood control? It is interesting to learn that on streams that were well impounded the waters did not rise to previous heights. Altho ten to fifteen feet of water went over some of the spillways all the newer dams held. Storage dams in the upper waters of the Connecticut prevented flood damage for seventy-five miles down stream. The dams that broke were of the old wooden type or had a dirt center with a stone face. The New England Power Company is already contemplating the construction of further storage reservoirs in the upper Connecticut watershed. They would conserve flood waters of about one-third of the 6,500 square miles of Connecticut River drainage area, north of the Massachusetts line.

These problems are now receiving attention from Congressional committees, federal departments, state geological surveys, and various bodies of scientific and commercial organizations. Out of these studies much will be learned regarding the most effective measures to be taken for flood prevention, and problems applicable to other parts of the United States as well, will, at least in some measure, be solved. Thus the study of this flood, which was distinctly sectional in character, will, undoubtedly, lead to results of national significance.

EDITORIAL NOTES AND NEWS

Materials in Geography was the title of a course offered by Clark University in the summer session of 1927. Various business concerns furnished an abundance of free literature which members of the class organized into a form suitable for classroom use. As an outgrowth of this course, Clark University has decided to assemble and distribute literature of special value to teachers and pupils of geography. A package of this material will be sent to any address on receipt of $1.00 to cover cost of preparation and mailing. Exhibits of important products such as cereals, cotton, silk, etc., will also be furnished at the cost of preparation. A list of these available exhibits and the cost of each will be sent on application to Clark University, Home Study Department, Worcester, Massachusetts.

The National Number of the Montreal *Herald*, 1927 (130 pp.), brings together a mass of exceedingly valuable material that the average reader would otherwise have to seek from a variety of sources. It contains discussions on the natural resources, industries, Provinces, and principal cities of Canada. The cost is 25 cents per copy.

A new base map of the Mississippi flood area has just been published by the Department of Interior. The area mapped extends from Dubuque to the Gulf, and from the vicinity of Omaha, Tulsa, and Houston on the west, to Chicago, Evansville and Tuscaloosa on the east. The scale is approximately 16 miles to the inch. It may be obtained from the Geological Survey, Washington, at 50 cents a copy.

Mr. O. W. Freeman of the State Normal School, Cheney, Washington, and who was instructor in geography at the University of Hawaii last year, provides the following valuable data for teachers. The following pamphlets have been prepared for the information of the public and may be secured by applying at the address given. Without exception they will be found to contain a great deal of highly interesting and valuable geographic material on Hawaii that can be used in the public schools.

The Story of Sugar in Hawaii. 96 pages, illustrated. Published by the Hawaiian Sugar Planters Association, Honolulu, T.H., 1926.

The following three booklets are printed and distributed by the California and Hawaiian Sugar Refining Corporation, 215 Market St., San Francisco, California.

Something About Sugar. 31 pages, illustrated, 1925.

Manufacture of Refined Cane Sugar, 27 pages, illustrated, 1925.

Crockett, a Name to Conjure By, 21 pages, no date.

"By Nature Crowned" is the title of an illustrated folder about the growing and canning of pineapples. Published by the Hawaiian Pineapple Co., San Francisco and Honolulu.

Hawaii, A Geographic-Historic Outline. 18 pages, illustrated, no date. Matson Navigation Co., 215 Market St., San Francisco, California.

Folder on Hawaii published by Los Angeles Steamship Co., Los Angeles, California.

Illustrated folder on Hawaii, also folders on each of the islands of Oahu, Maui, Kauai and Hawaii are issued by the Hawaii Tourist Bureau, Honolulu, T.H., or 215 McCann Bldg., San Francisco, California.

The center of production of electricity by public-utility power plants in 1907 was located out in Lake Michigan about 45 miles northeast of Chicago. In 1917 the center was about 65 miles west by north of Chicago, having moved about 85 miles in a southwesterly direction in the 10-year period since 1907. In 1926 it was 55 miles west by south of Chicago, having moved about 20 miles in a southeasterly direction from its position in 1917.

The relatively small movement of the center of output since 1907 is an indication of the general increase in utilization of electricity in all parts of the country. During the period from 1907 to 1926 the output increased from 10.6 to 73.8 billion kilowatt-hours, or nearly 600 per cent in the 20-year period. The increase in population during the same period was only 34 per cent. The relative increase in total output is about the same as the relative increase in the per capita use of electricity, which is 1907 was 122 kilowatt-hours and in 1926 was 630 kilowatt-hours. The per capita consumption of electricity in Germany in 1926 was only 180 kilowatt-hours, or less than one-third of the per capita consumption in the United States.

The Bureau of Foreign and Domestic Commerce has issued a series of special circulars giving selected references to the Far East. The whole bibliography is published in eight sections as follows:

Section 1. Special Circular No. 44. General Bibliography on Commerce and Trade
Section 2. Special Circular No. 45. General Bibliography on the Far East
Section 3. Special Circular No. 46. Bibliography on Japan and Chosen
Section 4. Special Circular No. 47. Bibliography on China
Section 5. Special Circular No. 48. Bibliography on India, Burma and Ceylon
Section 6. Special Circular No. 49. Bibliography on Australia and New Zealand
Section 7. Special Circular No. 50. Bibliography on the Philippine Islands, Hawaii, and the South Sea Islands
Section 8. Special Circular No. 51. Bibliography on the Dutch East Indies, British Malaya, Siam and Indo-China

The Cleveland Public Schools have published a catalog of their lantern slides. The slides are arranged in unit sets to illustrate definite lesson topics. Each set has a call number, and is housed in the Educational Museum. On application, the sets are delivered to the various rooms where they may be retained for a week's use.

The Romantic Story of Silk is the title of an attractive booklet published especially for use in schools. By mentioning the *Journal of Geography* it may be obtained upon request from The Silk Association of America, 468 Fourth Ave., New York. The story relates the discovery of silk weaving by the Chinese, probably in 1700 B.C. Not until A.D. 555 did the secret of the process become known to Europeans. Pictures illustrate the various cycles in the life of the silk worm and the processes by which its fiber is woven into silk.

At the celebration of the Semi-centennial of the University of Oregon and the inauguration of President Arnold Bennett Hall, Frederic L. Paxson discussed the "Trail of our Border." His paper appears in the *Commonwealth Review* of the University of Oregon, Vols. VIII-IX, Nos. 4 and 1, pp. 52-73, Eugene, Oregon. We no longer have a frontier, but the by-product of it still affects our life and thought. We seek its romance in the "dude" ranch, the wild west show, the themes of some of our movies and literature. Just as the frontiersman was often a law unto himself, so the bootlegger and his trade follows the ruts of the old trail that had no respect for the laws. Politically, too, we line up with the old class distinction centered around the problems of the farmers' surplus and that of the factory, and our foreign attitude is colored by the principles of our frontier past.

The U. S. Geological Survey has a number of topographic maps for sale at two cents a copy. These maps ordinarily sell at ten cents a copy. The Survey is disposing of them at this low figure in order to make way for new editions on which certain marginal

errors will be corrected, or on which certain cultural aspects will be revised. A list of these maps may be had from the Director of the Survey, George Otis Smith.

By writing to School Health Service, The Quaker Oats Co., 80 East Jackson Street, Chicago, Illinois, you may secure a free copy of an attractive ninety-six page booklet, Grain Through the Ages. It is intended for use in the upper grades. They have a similar booklet for the lower graes, Hob o' the Mill.

Glimpses of our National Parks and Glimpses of our National Monuments are the titles of two illustrated pamphlets (1927) which may be obtained free upon written application to the director of the National Park Service, Interior Department, Washington, D.C. This Service also offers free pamphlets descriptive of our National Parks, the routes by which they may be reached, and the regulations governing them. The maps in the pamphelts (1927) on Mount McKinley and Hawaii National Parks are of more than passing interest. It is also interesting to note that the Kilauea Volcano House, a modern hotel of 100 rooms, provides steam and sulphur baths, using live steam and heat from the volcano.

Last spring W. R. McConnell of the geography department of Miami University addressed the general assembly as well as a sectional meeting of the South Central Division of the Illinois State Teachers' Association. The appearance of geographers on such programs is an effective way of getting geography before the general public and body of teachers of all grades.

The Department of Interior announces the recent publication of two notable topographic maps. The areas embraced are the Sequoia and General Grant National Parks, and the east half of the Grand Canyon National Park. The maps are sold at twenty-five cents a copy.

Indian wheat exports are unlikely to increase. Greater production and home consumption are probable, but the percentage exported is likely to be of minor significance in the international wheat market. These are the conclusions reached by the Food Research Institute of Stanford University, California. The results of their investigations are published under the title, India as a Producer and Exporter of Wheat, Vol. III, No. 8 of Wheat Studies. It is their opinion that the increase in production will be accomplished by the use of better machinery and the introduction of new varieties of wheat and the expansion of acreage thru the reclamation of waste lands. However, the ever-increasing population will keep down the exportable surplus.

The Pioneer Publishing Company, Fort Worth, Texas, publish a circular entitled, Free Geography Material and Where to Get It, by Guy V. Richey. The cost is ten cents.

A joint committee on School-Museum Relations recently drafted a number of recommendations which were adopted by both the N.E.A. and the American Association of Museums. These recommendations urge co-operation between schools and museums. The schools should place the emphasis on nature study out doors, but should supplement this thru contact with the materials of museums placed freely at the service of the public schools. To aid in this accomplishment, teachers should train their pupils in observation and exposition, and boards of education and of museums should share the expenses of making the materials available either thru circulation or thru visits to the museum. Wherever public museums are not established, steps should be taken to establish school museums.

The following publications of the Oklahoma Council of Geography Teachers are now available in mimeograph form. Circular 1, List of Geographical Materials and

Exhibits. 11 pp. 10 cents. Circular 3, Geography Games. 34 pp. 20 cents. Library List (Issued Feb. 9, 1927). 8 pp. 10 cents. Circular 5, Part I, Projects and Study-Teaching Outlines in Geography. 42 pp. 40 cents. These publications may be secured by addressing Box 26, Faculty Exchange, University of Oklahoma, Norman, Oklahoma.

Lead never ranked first in value in the output of Leadville. After millions of dollars of gold were taken out, silver was the big product until 1903 when it was surpassed by zinc. Since then, zinc has exceeded all the other metals except in 1922-23 when, owing to a dull zinc market, silver again was in the lead. Copper, manganese and bismuth have all contributed a share in the total production which at the end of 1926 had reached 435 millions. A new report on the geology and ore deposits of the Leadville District has been published as Professional Paper 148 of the Geological Survey. The price is $2.50. A shorter report, Bulletin 779, may be secured for 35 cents from the Superintendent of Documents, Washington, D.C.

The last number of Vol. I of the Bulletin of Nebraska Chapter of the National Council of Geography Teachers contains a project for fifth and sixth grades, entitled, Going Into Business in South America, by Edith M. Beaumont, Intermediate Supervisor, Wayne, Nebraska. The Bulletin proved to be such a success that the Nebraska Council decided last May to continue its publication. Five issues of five pages each will be published this year. E. E. Lackey of the Department of Geography, University of Nebraska, is the editor. The subscription price of twenty-five cents entitles one to membership privileges in the Nebraska Chapter.

A year ago the geography teachers of Connecticut organized a State Council of Geography Teachers. They affiliated themselves with the State Teachers' Association, and secured geography speakers at the four state conventions held in October. President Atwood of Clark University spoke at two of the meetings, while Dr. S. van Valkenburg addressed the other two conventions. Dr. van Valkenburg is a visiting professor at Clark from Holland. The sectional meetings were so well attended that the Council hopes to make them permanent organizations. This winter the sectional organizations will hold a combined meeting sponsored by the State Council.